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ABSTRACT

This curricular guide focuses on life science and is designed for use with seventh grade students. Life science was chosen as the course of study based on the rationale that, as pupils enter junior high school, they are in early adolescence and find it difficult to understand themselves so that the study of living things with a thorough explanation of the functions of the human body and its behavior seems appropriate. The guide contains objectives (not stated in behavioral form), a content outline, types of suggested activities, materials required, points to consider when evaluating the attainment of the objectives, a 362-word vocabulary list (arranged in alphabetical order), a bibliography for students and for teachers, and a list of filmstrips available in the professional library of the school district (Rock Hill, South Carolina) for which this guide was developed. (PEB)

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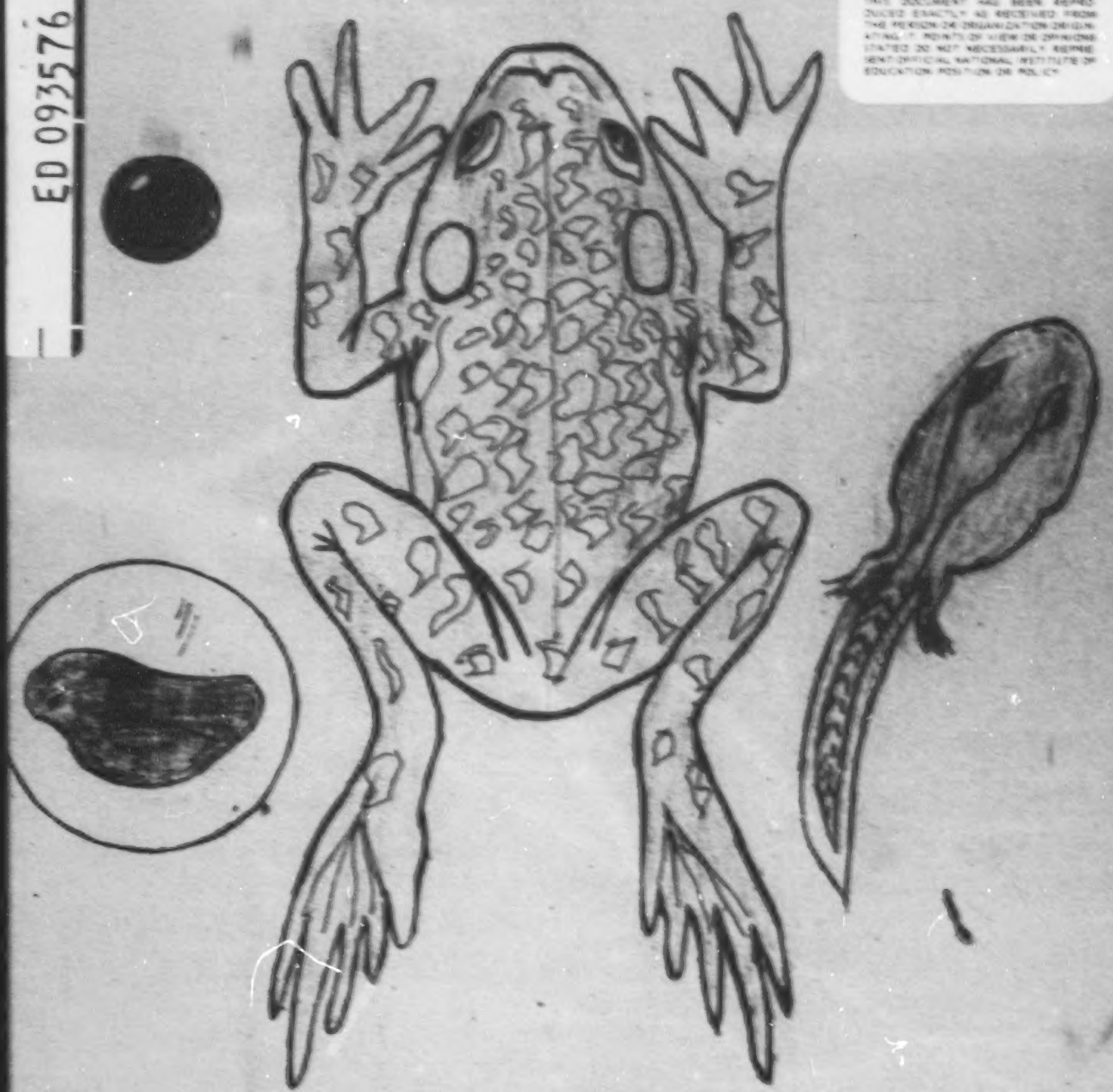

LIFE SCIENCE

GRADE 7

SE 016 485

LIFE SCIENCE

CURRICULAR GUIDE

PREPARED BY:

SEVENTH GRADE TEACHERS

OF

ROCK HILL SCHOOL DISTRICT #3

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PHILOSOPHY

PHILOSOPHY

The significance of science in the life of every person is deep and far-reaching. Contributions from science are so much a part of everyday living that the study of modern science in this spage age has a profound effect on the lives of young Americans.

Since science is an essential part of the curriculum in the schools, it should provide experience through which children may come to understand their physical environment. These experiences should develop an awareness to the plants, the animals, the earth's surface, the earth's neighbors, and the forces of nature -- gravity, magnetism, electricity.

INTRODUCTION

Life science can be a magic carpet of adventure and discovery. It can bring to life a fairyland in one's own backyard. But most important, life science is the study of the body and mind, and holds the secret of bodily health, of mental happiness, and of useful citizenship.

As a child enters junior high school during early adolescence, he often finds it difficult to understand himself. A study of living things with a thorough explanation of the functions of the human body and its behavior seems appropriate at this time.

The general plan of presentation and organization of units in this study guide provides for a maximum flexibility in gearing the course to a variety of ability levels and areas of special interest.

SPECIFIC OBJECTIVES

1. To meet the felt needs of pupils, and further, to arouse an abiding interest in life science problems of great moment to mankind.
2. To help develop, on the junior high level, skill in scientific thinking, which includes:
   (a) The ability to distinguish fact from inference
   (b) The ability to follow the chain of reasoning by which a scientific generalization grows out of a body of fact
3. To help inculcate the scientific attitude which includes:
   (a) Willingness to suspend judgment when evidence is lacking
   (b) Eagerness to search out the evidence on which opinion must rest
   (c) Readiness to alter one's views when new evidence demands it
   (d) Respect for the views of others, however different they may be, provided they rest on a body of fact or reasoning
4. To provide the student with experiences which will promote reflective thinking and problem solving
5. To help the pupil understand the working of his body so that there may be developed a desire to achieve physical and mental health
6. To help the pupil understand how a knowledge of life science may be used in improving our social and economic organization
7. To help satisfy the insatiable curiosity of pupils at the junior high level

CONTENT OUTLINE

PART I: Unity

The earth is populated by millions of different types of living creatures. All have their own way of living, but all share a similarity in structure and chemical organization. All plants and animals solve the problem of living by carrying on the same functions.

A. Introduction to Life Science

1. What is Life Science?

(a) Effects on man and his environment

(1) Overcome superstitions

(2) Improved health and sanitation

(3) Better food production

(4) Conquest and control of diseases

(b) The branches of life science

(c) How the biologist works (scientific method)

2. The Compound Microscope

(a) Parts of the microscope

(1) Optical parts

(2) Mechanical parts

(3) Illuminating parts

(b) Care of the microscope

(c) Using the microscope

(1) Preparing and examining slides

(2) The meaning of magnification

(d) The importance of the microscope

3. Observing and Learning Familiar Plants and Animals

B. The Nature of Life

1. What is Life?

(a) The life functions

(1) Ingestion

(2) Digestion

(3) Absorption

(4) Circulation

(5) Assimilation

(6) Excretion

(7) Movement

(8) Sensitivity

(9) Respiration

(10) Reproduction

2. The Basic Structure of Living Things (cells)

(a) Typical plant and animal cells

(1) Cell membrane or plasma membrane

(2) Cytoplasm (component parts)

(3) Nucleus (component parts)

(4) Cell wall (plant cell only)

(b) Microscopic study of cells

(1) Onion skin cells

(2) Elodea cells

(3) Epithelial cells from inside of cheeks

(4) Blood cells (a blood smear)

(c) Protoplasm

(1) Composition of protoplasm (organic and inorganic compounds)

(2) Physical appearance of protoplasm

(d) Comparison of a plant and animal cell

(1) Similarities pointed out

(2) Differences pointed out

(e) The cell theory

(1) Robert Hooke
(2) Anton van Leeuwenhoek
(3) Robert Brown
(4) Matthias Schleiden
(5) Theodore Schwann
(6) Hugo von Mohl

(f) Specialization of cells in organisms

(1) Tissue - a group of cells similar in structure and function

(2) Organ - a group of tissues with similar functions

(3) System - a group of organs working together to carry out a specific function

3. Basic Functions of Living Things (cells)

(a) The work of cells

(1) The synthesis of large molecules

a) Polymerization - linking two similar molecules by the splitting off of water molecules

(2) The breakdown of large molecules

a) Hydrolysis - breaking down large molecules by the addition of water molecules

(3) The work of the nucleus

a) Chromosomes and nucleic acids (DNA)

(4) Release of energy in the cell

a) Adenosine triphosphate - ATP

b) Adenosine diphosphate - ADP

c) ATP - ADP cycle

C. Life Depends on the Nonliving World

1. Some chemical and physical processes of life

(a) Chemical substances

(1) Elements
(2) Compounds
(3) Mixture
(4) Organic substances
(5) Inorganic substances
(6) Atoms and molecules

(b) Oxidation

(1) What is oxidation? (stress chemical change)
(2) Differences in slow and rapid oxidation
(3) The two compounds produced when organic compounds are oxidized - H_2O and CO_2
(4) Heat is produced by the chemical change.
(5) Light is produced during rapid oxidation.
(6) Oxygen is necessary for oxidation.
(7) Oxidation occurs within the cells

(c) Osmosis and diffusion

(1) Demonstration of osmosis through an animal membrane or cellophane
(2) Demonstration of osmosis (diffusion) with thin slices of white potatoes in tap water and in salt water
(3) Stress the difference in imbibition and diffusion

2. The raw material of life

(a) Repeated use of same materials

(1) Carbon dioxide - oxygen cycle
(2) Nitrogen cycle
(3) The balanced aquarium

(b) The ultimate source of energy for life

(1) Green plants capture the sun's energy
(2) Non-green plants and animals receive the sun's energy from the green plants

3. Adaptations of living things

(a) Essentials for life in the environment

(1) Food

(2) Oxygen

(3) Water

(4) Sunlight

(b) Kinds of environments

(1) Ocean

(2) Fresh water

(3) Woods or forests

(4) Desert

(5) Polar regions

(6) Temperate, Frigid, and Torrid Zones

(c) Obtaining the essentials from the environment

(1) Obtaining food - stress hibernation; estivation; migration

(2) Obtaining water - stress the need of water

(3) Obtaining oxygen - stress the need of oxygen

(4) Maintaining proper temperature - stress warm-blooded and cold-blooded animals

(5) Maintaining proper pressure

(d) Protective adaptations - (a few examples)

(1) Rose plant - thorns

(2) Rabbit - powerful hindlegs

(3) Turtle - shell

(4) Mimicry - monarch and viceroy butterfly

(5) Protective coloration may be mentioned

(e) Relationships among organisms

(1) Plants and animals that feed upon living organisms - parasites

(2) Plants and animals that feed upon dead organisms - saprophytes

(3) Dissimilar organisms that live together

a) Symbiosis - example; lichens

b) Commensalism - example; remora and shark

(f) The balance of life

(1) Population of species limited by their food supply

(2) Population of species limited by their enemies

(3) Man upsets the balance of life in some localities

PART II: Diversity

The diversity among living things is more obvious in many ways than the fundamental unity in life. Diversity is outstanding because one can easily observe the various modifications taken on by different types of living things.

A. The Variety of Life

1. The classification system of living things

(a) Plants and animals grouped on the basis of similarities in structure

(b) Main heading of the classification system

(1) Kingdom
(2) Phylum
(3) Class
(4) Order
(5) Family
(6) Genus
(7) Species

(c) Scientific name of plant or animal; the genus name plus species name

(d) Stress Carolus Linnaeus

(e) Introduce the word "taxonomy"

2. Kinds of plants

(a) The simplest plants

(1) Bacteria - smallest plants

(2) Fungi - plants without chlorophyll

(3) Algae - simple green plants

(4) Lichens - alga and fungus plant (symbiosis)

(b) More complex plants

(1) Mosses and liverworts

(2) Ferns and horsetails

(3) Seed-producing plants

a) Gymnosperms - conifers

b) Angiosperms - flowering plants

1) Monocatyledons - example; corn

2) Dicotyledons - example; bean

3. The Invertebrates - animals without a backbone

(a) Protozoa - one-celled animals

(1) Ameba (close look)

(2) Paramecium (close look)

(b) Sponges - simple many-celled animals

(c) Coelenterates - hollow-bodied animals

(1) Hydra (close look)

(d) Simple worms

(1) Planaria (close look)

(2) Parasitic flatworms

a) Tapeworm (close look)

b) Liverfluke (close look)

(3) Parasitic roundworms

a) Hookworm (close look)

b) Trichina worm (close look)

(e) Segmented worms - earthworm

(f) Mollusks - soft-bodied animals

(g) Echinoderms - spiny-skinned animals

(h) Arthropods - animals with jointed legs

(1) Crustaceans - crayfish (close look)

(2) Arachnids

a) Spiders

b) Scorpion

(3) Myriopods

a) Centipedes

b) Millipede

(4) Insects (close look)

a) Insect orders

b) Stages in development of insects

c) Insect pests

d) Useful insects

e) Social insects

4. The Vertebrates - animals with backbones

(a) Fishes

(1) Aquatic vertebrates

(2) Breathe with gills

(3) Cold-blooded vertebrates

(b) Amphibians

(1) Vertebrates that live in water and on land

(2) Breathe with gills - tadpole stage

(3) Breathe with lungs and through moist skin - adult stage

(4) A close look at the frog

(c) Reptiles

(1) The first true land vertebrates

(2) Dry, scaly skin

(3) Identifying poisonous snakes

(4) Cold-blooded vertebrates

(d) Aves (birds)

(1) Vertebrates with feathers

(2) Warm-blooded vertebrates

(3) Vertebrates with wings

(e) Mammals

(1) Vertebrates with hair covering body

(2) Vertebrates that bear live offsprings

(3) Vertebrates that feed their young with "milk" produced by mammary glands

(4) Some important groups (orders) of mammals

a) Monotremes - duckbill

b) Marsupials - kangaroo

c) Insectivores - anteater

d) Ungulate - hoofed mammals

e) Chiroptera - bat

f) Cetacea - whale

g) Carnivores - cat, dog

h) Rodents - rat, squirrel

i) Primate - monkey

(5) The classification of man (sample classification)

a) Kingdom - Animal

b) Phylum - Chordata

c) Subphylum - Vertebrata

d) Class - Mammalia

e) Order - Primate

f) Family - Hominidae

g) Genus - Homo

h) Species - Sapiens

i) Variety - Caucasian; Negro; Mongolian; Australoid

B. The Green Plant Makes Food

1. Roots and Stems

(a) The root

(1) Growth and development

(2) Structure

(3) Functions

(4) Types of roots

a) Tap root

b) Fibrous root

c) Brace root

d) Fleshy root

(5) Responses in growing roots

a) Geotropism (positive)

b) Hydrotropism (positive)

(6) Uses of roots by man

a) Conservation of topsoil

b) Food; drugs; spices; dyes

(b) Stems

(1) Structure

a) Monocots

b) Hebaceous dicots

c) Woody dicots

(2) Functions

(3) Modified stems

a) Runners

b) Tuber

c) Tendril

d) Bulb

e) Corm

2. The Leaf and its Functions

(a) External appearance and structure

(1) Parts of a leaf

(2) Arrangement of leaf on the stem

a) Alternate

b) Opposite

c) Whorl

d) Spiral

e) Rosette

(3) Classification of leaves

a) Simple leaf

b) Compound leaf; Pinnate or Palmate

c) Types of venation; netted or parallel

(b) Internal structures and their functions

(1) Epidermis

(2) Stomates

(3) Palisade cells

(4) Spongy cells

(5) Chloroplasts

(6) Veins

(7) Guard cells

(c) Photosynthesis

(1) Raw materials

a) Carbon dioxide

b) Water

(2) End products

a) Glucose

b) Oxygen (by-product)

(3) Importance of light

(4) Importance of chlorophyll

(5) The gas taken in during photosynthesis

(6) The gas given off during photosynthesis

(d) Transpiration

(1) What is transpiration?

(2) The regulation of transpiration by guard cells

(3) Transpiration and the pull of water up through a plant

(4) Transpiration and wilting in plants

(5) How desert plants are protected against wilting.

PART III: Life Science Applied to the Human Body

The human being carries on the same fundamental functions as other living things. This phase of the work acquaints the child with the general structure of the body and how the life functions are carried on. The pupil becomes acquainted with the various defenses the body has against diseases and ways in which man prevents and conquers diseases. The effects of alcohol, narcotics, and tobacco on the body are stressed. Man in space is also emphasized.

A. Food for the Human Body

1. The nutrients

(a) Carbohydrates - food for energy

(b) Fats - food for energy

(c) Proteins - food for growth and repair of tissues

(d) Other necessary substances in food

(1) Minerals

(2) Vitamins

(3) Water

(e) Test for the nutrients

(1) Carbohydrate - iodine

(2) Fruit sugar - Fehling's solution

(3) Fats - Rub on unglazed paper

(4) Proteins - nitric acid

2. The human diet

(a) The meaning of a "balanced diet"

(b) The number of calories needed

(c) Proteins, minerals, and vitamins needed

(d) Planning and checking your diet

(e) Buying food wisely

B. The Human Body in Operation

1. The body as a whole

(a) The architectural plan of the body

(1) Backbone

(2) Similar right and left side (bilateral symmetry)

(3) Body cavities; cranial, spinal, thoracic, and abdominal cavity

(b) The four kinds of tissues

(1) Epithelial

(2) Muscle

(3) Nerve

(4) Connective; bone, blood, fat

(c) The systems of the body

(1) Skeletal

(2) Muscular

(3) Respiratory

(4) Circulatory

(5) Excretory

(6) Digestive

(7) Endocrine

(8) Reproductive

(9) Integumentary

(10) Urinary

2. The skeleton and muscles

(a) The functions of the skeleton

(b) Structure of a bone

(c) Kinds of joints in the body

(d) Tissue that connects a bone to a bone - ligament

(e) Major bones of the body

(f) The functions of the muscles

(g) Three kinds of muscular tissue

(1) Skeletal or striated

(2) Smooth or nonstriated

(3) Heart or cardiac

(h) Two main kinds of muscles

(1) Voluntary - muscles controlled by will

(2) Involuntary - muscles not controlled by will

(i) How skeletal muscles move a joint

(1) Flexor muscles

(2) Extensor muscles

(j) Tissue that connects muscles to bones - tendon

3. Preparing food for the cells

(a) Specialized structures for food taking

(1) Ameba - pseudopods

(2) Hydra - tentacles

(3) Earthworm - takes food in with soil

(4) Moth - sucking mouth parts

(5) Frog - long tongue

(6) Others

(b) Human teeth

(c) Nature of digestion

(1) Digestive juices and enzymes

(2) Types of digestive systems

a) Ameba - food vacuole

b) Herbivorous mammal - two "stomachs"

(d) Human digestive system

(1) Organs of digestive tract

(2) Auxiliary organs of secretion

(3) Stages in digestion

a) Mouth b) Stomach c) Small intestine

4. Servicing the cells

(a) Parts of the circulatory system

(1) Heart

(2) Blood vessels

a) Arteries

b) Veins

c) Capillaries

(b) Functions of circulation

(1) To carry food and oxygen to the cells

(2) To remove nitrogenous wastes and CO_2 from the cells

(c) Human circulatory system

(1) Structure and function of the heart

(2) Structure and function of blood vessels

(3) Components of blood

a) Plasma

b) Red blood cells

c) White blood cells

d) Platelets

(4) Blood paths through the human body

(5) The lymphatic system

(6) Blood transfusions and blood types

(d) Respiration

(1) Respiratory system in man

(2) Mechanics of breathing

(3) Exchange of gases in the lungs

(4) Exchange of gases between the cells and the blood

5. Excretion in man

(a) The human kidneys

(b) Structure of the skin

(c) Other organs of excretion

(1) Lungs

(2) Liver

(3) Large intestine

C. The Body Under Control

1. How organisms respond

(a) Response in plants and unicellular animals

(b) Nervous systems in more complex animals

2. The human nervous system

(a) The neuron

(b) Parts of the brain

(c) The spinal cord

3. Divisions of the nervous system

(a) Central nervous system

(b) Peripheral nervous system

(c) Autonomic nervous system

4. Sense organs

(a) The eye (a close look)

(b) The ear (a close look)

(c) Other sensations

(1) Taste (tongue)

(2) Smell (nose)

(3) Touch (skin)

(4) Hunger and thirst

(5) Temperature; pressure; pain

5. The human nervous system at work

(a) Reflex actions

(b) Conditioned reflexes and habits

(c) Memory and learning

(d) Intelligence (e) Emotions

6. Chemical influences on the body

(a) The nature of ductless glands

(b) Major ductless glands

(1) Name of the hormone secreted by each gland

(2) The influence each hormone has on the body

(c) Stimulants and depressants

(1) Caffeine (3) Alcohol

(2) Tobacco (4) Narcotics

D. Toward Freedom from Disease

1. The nature of communicable diseases

(a) Pathogenic microorganisms

(b) Controlling disease organisms in the environment

(1) Transmission of disease organisms

(2) Reducing the spread of microorganisms

a) Use of antiseptic

b) Use of disinfectant

(3) Food preservation

(4) Public health measures

2. Body defenses against agents of diseases

(a) Direct defenses

(1) Skin

(2) Respiratory passages

(3) Stomach (hydrochloric acid)

(4) White blood cells

(5) Antibodies

(b) Immunity

(1) Natural immunity

(2) Acquired immunity

(3) Active and passive immunity

(c) Drugs and antibiotics

(1) Penicillin

(2) Streptomycin

(3) Aureomycin

(4) Sulfa drugs

(5) Others

3. Some diseases caused by microorganisms and worms

(a) Diphtheria, typhoid, tuberculosis - bacteria

(b) Rocky Mountain spotted fever - rickettsiae

(c) Malaria - protozoan

(d) Trichinosis - trichinae

(e) Hookworm disease - hookworms

(f) Tapeworm disease - tapeworm

4. Virus diseases (common ones)

(a) Smallpox

(b) Chickenpox

(c) Common cold

(d) Poliomyelitis

(e) Mumps

(f) Measles

(g) Hepatitis

5. Noncommunicable diseases and aging

(a) Heart disease

(b) Cancer

(c) Increasing life expectancy

E. Man in Space

1. A capsule environment

(a) Major problems of a capsule environment

(1) Supply of oxygen

(2) Possible sources of water

(3) Disposal of solid waste material

(4) Maintaining a comfortable relative humidity and temperature

(5) Overcoming various stresses on the body

(b) Solving the problems of a capsule environment

(1) The growth of algae

(2) Converting urine and perspiration into pure water

(3) Converting solid waste into nitrogenous compounds

(4) Training within an altitude chamber

2. Environment outside the capsule

(a) Hazards of radiation

(b) The Van Allen belts (earth's magnetic field)

PART IV: Continuity

Living organisms die, but life continues in their offspring. Reproduction is a life function which serves the species, rather than the individual plant or animal. The resemblance existing between the parents and their offspring, as well as the differences, are explained to a degree in this phase of life science.

A. Methods of Reproduction

1. Reproduction in simple plants

(a) Asexual methods

(1) Fission

(2) Budding

(3) Spore formation

(b) Sexual reproduction

(1) Conjugation

(2) Male and female gametes (sex cells)

(3) Alternation of generation

2. Reproduction in flowering plants

(a) Methods of pollination

(b) Fertilization

(c) Development of seeds

(d) Structure and functions of a flower

(e) Vegetative propagation

(1) Bulbs - natural method

(2) Rhizomes - natural method

(3) Runners - natural method

(4) Tubers - natural method

(5) Cutting - use by man

(6) Grafting - use by man

(7) Budding - use by man

3. Reproduction in lower animals

(a) Fission

(b) Regeneration

(c) Conjugation

4. Reproduction in vertebrates

(a) Reproductive organs of the frog

(b) Development of the fertilized egg

1) Early stages in development

2) Development of tissues and organs

(c) Protection of young animals (parental care)

B. The Story of Heredity

1. The carriers of heredity
   (a) Chromosomes
   (b) Genes
   (c) DNA molecule
2. The importance of genes in heredity
   (a) Number of chromosomes in body cells
   (b) Number of chromosomes in matured sex cells
   (c) Fertilization - original number of chromosomes restored to zygote
3. Interesting sidelights on heredity
   (a) The case history of European royal family
      (1) Hapsburg family
      (2) Queen Victoria's descendants - hemophilia
      (3) The Bach family - talented musicians
   (b) Distinguishing physical characteristics
4. Factors that determine sex of new offspring
5. How man uses his knowledge of genetics
   (a) Improvement of plants for commercial purposes
   (b) Improvement of animals for commercial purposes
6. The importance of environment in determining what kind of person one will be
   (a) Basic needs - food, shelter, clothing
   (b) Educational needs
   (c) Cultural and social needs

PART V: Conservation of Our Natural Resources

Conservation of natural resources touches on wastage of all resources. This phase of life science stresses the importance of practicing wise use of our resources.

A. Preserving Our Natural Wealth

1. The balance of life

(a) Food chains

(b) Natural controls on population

(c) How man upsets the natural balances

2. Conservation of renewable resources

(a) Conservation of water

(1) Controlling runoff

(2) Flood control

(b) Conservation of soil

(1) Nature and origin of soil

(2) Soil erosion

(3) Soil depletion

(c) Conservation of forests

(1) Value of forests

(2) Lumbering and reforestation

(3) Threats to our forests

a) Fire

b) Disease

c) Insects

d) Animals

3. Conservation of wildlife

(a) Birds

(1) Value of birds

(2) Protection of birds

(3) Identifying common birds

(b) Other wildlife

(1) Fish and seafood

(2) Game and fur-bearing animals

(3) Wildflowers

4. Natural enemies of man

(a) Harmful insects

(1) Identification

(2) Harm done

(3) Control

(b) Weeds and poisonous plants

(1) Identification

(2) Harm done

(3) Control

B. An introduction to ecology

1. Plant and animal communities

2. Succession

3. Climax communities

PART VI: Concepts in Life Science

A. All living things are dependent on one another and on their environment.

B. Plants and animals are adapted to different environments.

C. Plants and animals within a given environment are interdependent.

D. Interdependent living things are joined in a community.

E. In any living community, there are food chains typical of that community.

F. The green plants of the oceans capture light energy and use it to make food.

G. Environmental conditions on land vary to a greater degree than they do in water.

H. The types and numbers of living things vary with the environmental conditions.

I. On land, as in water, living things have developed that are adapted to the environmental conditions of a particular region.

J. Green plants must have light, water, and warmth to live and manufacture food.

K. Where living things are concerned, neither matter nor energy is created or destroyed. The totality of matter and energy is conserved.

L. The cell is the unit of structure and function of all living things.

M. Tissues are adapted by structure of their cells to carry on particular functions.

N. Single-celled organisms have all the structures (organelles) to carry on all of their functions.

O. Cells that are part of an organism have special adaptations for special functions.

P. Plants are adapted to survival on land by means of root and shoot systems.

Q. Green plants are adapted by structure for the manufacture of sugar.

R. Plants organisms are adapted for absorption of water and minerals.

S. The cell's chemical activity is based on the action of enzymes.

T. The cell's activity in building up compounds is based on two general chemical processes: polymerization, hydrolysis

U. A process of yielding energy (the cell's energy process) is essential to all the cell's activities.

V. To maintain their functions, the cells in an organism require a balanced intake of matter and energy.

W. Cells secrete substances that coordinate body activities.

X. Through the function of its cell membrane, the cell regulates intake and exit of substances.

Y. The basic source of energy for life processes is light energy.

Z. Woody plants are specially adapted for absorption of water and minerals.

AA. The photosynthetic process is basic to the metabolic processes in all living things.

BB. Organisms can be grouped (classified) on the basis of characteristics held in common.

CC. All organisms must be able to fulfill certain basic needs or they fail to survive.

DD. In classifying organisms, the greater the similarity within a given group, the more limited and precise is the grouping.

EE. The most successful groups of organisms are adapted to a variety of environments.

FF. As organisms ascend in complexity, their young need increasing care.

GG. Chromosomes carry hereditary traits.

HH. When gametes are formed, the two members of each pair of chromosomes separate into different gametes.

II. The code of heredity is found in deoxyribonucleic acid (DNA).

JJ. An organism is the product of its heredity and environment.

KK. There is a biological relationship among all organisms. The DNA molecule is very similar in structure no matter what the organism.

LL. Plant and animal populations tend to remain in balance unless there is a change in the interaction of species and environmental factor within the ecological community..

ACTIVITIES

I. Reading
   A. Textbook
   B. Supplementary books
   C. Magazines
   D. Current scientific literature

II. Discussion (formal and informal)
   A. Class
   B. Panel
   C. Group

III. Display
   A. Collection
   B. Poster
   C. Bulletin board
   D. Models
   E. Aquarium
   F. Terrarium

IV. Experiments and demonstrations

V. Conferences
   A. Interviewing others
   B. Committee work

VI. Research

VII. Listening
   A. Tape
   B. Records
   C. Radio
   D. TV
   E. Speakers

VIII. Visual Aids

A. Films and filmstrips

B. Pictures (taken from source materials)

C. Models

D. Transparencies

E. Microscopic study

IX. Other Related Activities

A. Science fairs

B. Assembly programs

C. Field trips

D. Trip to museums

MATERIALS (Suggested)

I. List of Equipment (class of 30 students)

A. Charts

1. General Life Science - 1
2. Physiology and Anatomy - 1

B. Optical Instruments

1. Microscopes - 8
2. Microprojector - 1
3. Magnifiers - 30

C. Aquaria and Terraria supplies

1. Aquarium tank, 10 gallon - 1
2. Terrarium tank or large jar - 1
3. Aerator - 1
4. Thermostat - 1

D. Prepared Slides

E. Clear Slides, 1/2 gross

F. Cover slip, plastic, 1 gross

G. Holders (clamps) test tube, 15

H. Racks, test tube, 15

I. Ring stand, ring and burette clamp, 15

J. Glassware

1. Beakers, 250 ml., 15
2. Beakers, 500 ml., 10
3. Bottle, milk, qt., 10
4. Bottle, milk, pt., 10
5. Bottle, plastic collecting, 15
6. Bottle, small, stoppered, 30
7. Cylinder, graduated, 10 ml., 8

8. Cylinder, graduated, 100 ml., 10
9. Flasks, Erlenmeyer, 250 ml., 10
10. Test tubes, 18 mm x 150 mm, 60
11. Pipette or medicine droppers, 15
12. Jar, battery, 10
13. Jar, glass, 1 gallon, 10
14. Jar, small (baby food), 100
15. Petri dish, 30
16. Mortar and pestle, 10
17. Stirring rods, glass, 10
18. Glass tube

K. Bunsen or propane burner, 10

L. Corks, assorted sizes 1-11, 1 gross

M. Thermometers, -20°c to 110°c, 10

N. Balance, 1

O. Models

1. Human torso
2. Heart
3. Eye
4. Ear

P. Dissecting kits - 10

Q. Supplementary books, pamphlets, etc.

II. List of Expendables (class of 30 students)

A. Chemicals (suggested)

1. Acetone, 1/2 pt.
2. Agar, 5 lbs.
3. Ammonium nitrate, 4 oz.
4. Ascorbic acid solution, 1 oz.
5. Benedict's solution, 4 oz.
6. Congo red solution, 2 oz.

7. Ethyl alcohol, 95%, 1 qt.
8. Formaldehyde
9. Iodine solution 1% (tincture), 4 oz.
10. Lugol's solution, 1/4 pt.
11. Methylene blue, powder, 2 oz.
12. Litmus paper, red and blue, 1 bottle
13. Filter paper, 1 box
14. Gibberellic acid
15. Sodium hydroxide, pellets, 1 oz.
16. Inophenol solution, 16 oz.
17. Sodium hydroxide, pellets, 1 oz.
18. Water, distilled, 2 gallons

B. Plant and animal materials

1. Algae, chlorella
2. Ants, living, 50
3. Crayfish, preserved, 30
4. Earthworms, dead, 15
5. Earthworms, living, 15
6. Euglena, 1 cutture
7. Flatworms, planaria, 50
8. Frog, 14
9. Hydra, living, 15
10. Paramecium and ameba
11. Plant, coleus, 13
12. Plant, elodea, 2
13. Plant, geranium, 6
14. Seedlings, bean, 50
15. Seedlings, corn, 50
16. Seeds, pea, 2 packages

17. Seeds, radish, 2 packages
18. Water fleas (daphnia)
19. Yeast, dry, 1 lb.

C. Readily available materials

1. Aluminum foil, 1 roll
2. Apple juice, 1/2 pt.
3. Bread, 2 loaves
4. Cardboard
5. Carton, milk
6. Celery stalks, with leaves
7. Cellophane: red, blue, yellow, orange, 3 sq. feet each color
8. Cloth, black
9. Cotton, 2 lbs.
10. Crackers, soda
11. Cup, paper, 8 oz., 100
12. Glue, general purpose
13. Ice, cubes
14. Ink, blue, washable, 1 bottle
15. Ink, red, washable, 1 bottle
16. Leaves, green, 2 in., 30
17. Lemon juice, 1/2 pt.
18. Liver, uncooked, 1/2 lb.
19. Matches, 1 box
20. Needles, sewing, 10
21. Orange juice, fresh, 1/2 pt.
22. Paper clips, 1 box
23. Paper towels
24 Paper, wax
25. Paper, filter, 1 box

26. Potatoes, white, 4
27. Salt, 1 box
28. Sand, fine, 1 lb.
29. Soil
30. Straws, soda, 1 box
31. String, 1 ball
32. Tape, cellophane, 1 roll
33. Tape, masking, 50 ft. roll
34. Toothpicks or tongue depressor, 1 box
35. Water, pond
36. Water, tap
37. Alarm clock, 1
38. Flashlights, 3
39. Flower pots, 4" x 4", 30
40. Hot plates, 2
41. Meter sticks, 10
42. Scissors, 10
43. Razor blades, 10
44. Tablespoon, 10
45. Teaspoon, 10
46. Thumbtacks, 1 box
47. Pan, shallow
48. Pins, straight, 1 box

EVALUATION

(Methods used in Accomplishing Objectives)

I. Guiding pupil through a series of clear-cut learning experiences such as:

   A. Encouraging critical thinking

   B. Encouraging and stressing the use of controls in experiments

   C. Encouraging the use of the library

II. Developing skills, such as:

   A. Teaching the pupil how to read and discover the main idea or concept

   B. Teaching the pupil how to use the textbook and references

   C. Teaching the pupil how to observe

   D. Training the pupil for class discussion

III. Using audio-visual aids

IV. Encouraging pupils to work on a science project of interest to them

V. Testing and observing pupils to discover real evidences of learning

VOCABULARY

1. abdomen
2. absorption
3. acromegaly
4. adaptation
5. adrenal
6. air sacs
7. albino
8. algae
9. alimentary canal
10. allergy
11. amino acid
12. amphibian
13. analbolism
14. anaerobic
15. anatomy
16. anemia
17. angiosperm
18. anther
19. anthropology
20. antibiotics
21. antibodies
22. antiseptic
23. appendages
24. aorta
25. aquatic
26. artery
27. asexual reproduction
28. assimilation
29. auricle
30. auxin
31. axon
32. bacillus
33. bacteria
34. bacteriology
35. behavior
36. beriberi
37. biennial
38. bile
39. binary fission
40. binome
41. biology
42. botony
43. breed
44. bronchi
45. bronchial tubes
46. calorie
47. calyx
48. cambium
49. canine
50. capillaries
51. carbohydrate
52. carbon
53. carbon dioxide
54. carnivores
55. carthilage
56. catabolism
57. caucasoid
58. cell
59. cellulose
60. cerebellum
61. cerebrum
62. chlorophyll
63. chloroplast
64. chordate
65. chromosome
66. cilia
67. cold-blooded
68. colloid
69. conifers
70. conservation
71. cornea
72. coronary
73. corolla
74. corpuscle
75. cotyledon
76. cretinism
77. crustacean
78. cytoplasm
79. deciduous
80. deficiency
81. dentrites
82. denitrifying bacteria
83. depressant
84. deoxyribonuclei acid
85. dermis
86. diabetes
87. diaphragm
88. diatom
89. dicotyledon
90. diffusion
91. digestion
92. dinosaur
93. diploid number
94. dominant
95. donor
96. dorsal
97. ductless glands
98. ecology
99. ectoderm
100. egg
101. electron microscope
102. element
103. embryo
104. emotions
105. emulsion
106. endocrine glands
107. energy
108. entomology
109. environment
110. enzyme
111. epidemic
112. epidermis
113. epiglottis
114. epithelial
115. erosion
116. esophagus
117. Eustachian tube
118. excretion
119. exoskeleton
120. extensor
121. extinction
122. fats
123. fauna
124. feeble-minded
125. fermentation
126. ferns
127. fertilization
128. filament
129. flagellum
130. flexor
131. flora
132. food
133. food chain
134. fossil
135. fraternal twin
136. fruit
137. function
138. fungi
139. gamete
140. ganglion
141. gastric juice
142. gene
143. genetics
144. genus
145. geotropism
146. germ
147. germ cell
148. germ layer
149. germination
150. gestation
151. gills
152. glands
153. glucose
154. glycogen
155. goiter
156. grafting
157. guard cells
158. Gymnosperm
159. habitat
160. haploid number
161. hemoglobin
162. hemophilia

163. herbaceous
164. herbivores
165. heredity
166. hibernation
167. homeostasis
168. hormone
169. humus
170. hybrid
171. hydrogen
172. hydrotropism
173. hypertension
174. hypha
175. identical twin
176. immunity
177. impulse
178. incisor
179. incubation
180. infectious
181. inoculation
182. insect
183. instinct
184. insulin
185. invertebrate
186. involuntary muscle
187. iris
188. irritability
189. islands of Langerhans
190. kingdom
191. larva
192. larynx
193. legume
194. lens
195. lenticels
196. lethal
197. lencocyte
198. leukemia
199. lichen
200. ligament
201. lipase
202. lymph
203. maggot
204. maltose
205. mammal
206. meiosis
207. medulla oblongata
208. meninges
209. mesoderm
210. metabolism
211. metamorphosis
212. microorganism
213. microscope
214. migration
215. mimicry
216. mitosis
217. molar
218. molecule
219. mongoloid
220. monocotyledon
221. mosses
222. mucous membrane
223. muscle tissue
224. mutant
225. mutation
226. narcotics
227. nectar
228. Negroid
229. nerve
230. neuron
231. niacin
232. nicotine
233. nitrifying bacteria
234. nitrogen
235. nucleus
236. nutrition
237. nymph
238. olfactory nerve
239. optic nerve
240. organ
241. organic compound
242. organic disease
243. organism
244. osmosis
245. ovary
246. ovule
247. oxidation
248. palisade cells
249. pancreas
250. parasite
251. parenchyma cells
252. parthenogenesis
253. pasteurization
254. pathogenic
255. peat
256. pedigree
257. pellagra
258. penicillin
259. pepsin
260. perennial
261. peristalsis
262. petal
263. petiole
264. phagocyte
265. phloem
266. photosynthesis
267. phototropism
268. phylum
269. pigment
270. pistil
271. pith
272. pituitary gland
273. plankton
274. plasma
275. platelets
276. pollination
277. primate
278. protein
279. protoplasm
280. protozoa
281. pseudopod
282. pupa
283. quarantine
284. race
285. recessive
286. reduction division
287. reflex act
288. regeneration
289. rennin
290. reproduction
291. reptile
292. respiration
293. responses
294. Rh factor
295. riboflavin
296. ribonuclei acid
297. rickets
298. rodents
299. roat hair
300. salivary glands
301. saprophyte
302. science
303. scurry
304. secondary sex characteristics
305. secretion
306. seed
307. segment
308. sepal
309. serum
310. sex cell
311. sex chromosome
312. sexual reproduction
313. somatic cell
314. species
315. Spermatophytes
316. spinal column
317. spinal cord
318. spiracle
319. spontaneous generation
320. stamen
321. stigma
322. stimulus
323. stomata
324. structure
325. survival
326. symbiosis
327. synapse
328. tadpole

329. taproot
330. tendon
331. tentacles
332. testis
333. thallophyte
334. thiamin
335. thorax
336. thyroid gland
337. tissue
338. toxin
339. trachea
340. transpiration
341. trichinosis
342. tropism
343. trypsin
344. tuber
345. vaccination
346. vaccine
347. vacuole
348. vascular system
349. vegetative propagation
350. vein
351. venereal disease
352. ventral
353. ventricles
354. vertebrate
355. virus
356. vitamins
357. voluntary muscle
358. warm-blooded
359. xylem
360. yolk
361. zoology
362. zygote

BIBLIOGRAPHY
AND
FILMSTRIPS

BIBLIOGRAPHY

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A. For students

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Filmstrips in the Professional Library

Rock Hill School District Number Three

Living Matter

S-4 Living Matter - Grade 7
S-8 Living Things Need Food
S-10 Bacteria
S-12 Looking for Animals

Fresh Water Communities

S-13 The Freshwater Community
S-14 Animals of the Pond
S-16 Small Fresh Water Animals and Insects
S-19 Keeping an Aquarium
S-20 How to Make an Aquarium
S-21 Around the Water

Sea Community

S-22 The Seashore Community
S-23 Plants and Strange Animals of the Sea
S-27 Animals of the Sea and Shore

The Tropical Community

S-29 Mammals of the Tropical Forests
S-32 Birds of the Tropical Forests
S-33 Reptiles and Amphibians of the Tropical Forests
S-34 Tropical Fishes

Other Communities and Relationships

S-35 Deserts
S-36 The Backyard Community

S-37 Changing Plant Communities
S-38 Animals Struggle to Live
S-39 Animal Pests
S-40 Animal Homes
S-42 Animals Fit Themselves to Their Surroundings
S-43 Animals of Our Continent
S-44 Animals of Far Away Lands

Conservation

S-46 Water Resources
S-47 Mineral Resources
S-51 Water and Soil
S-52 How Man Has Used the Soil
S-53 Minerals in the Soil
S-54 How Man Conserves the Soil
S-55 Plant Life and the Soil
S-56 Animal Life and the Soil
S-59 Man's Use and Control - Grade 7
S-61 We Protect Animals

General Information

S-62 Basic Food of Life
S-63 Plants and Water
S-64 Life Cycle of a Plant
S-65 Parts of a Flowering Plant
S-66 The Story of Seeds
S-67 Seeds and Seed Travels
S-68 Plant Factories
S-69 Kinds of Plants

Trees

S-71 Trees
S-72 Telling Trees Apart
S-73 Trees - Man's Best Known Plants

Wildflowers

S-74 American Wildflowers
S-79 Animals to Know
S-82 Animal Behavior
S-85 Toads Grow
S-86 Butterflies Grow

Insects

S-90 Butterflies and Moths
S-91 The Honey Bee
S-92 The Mosquito
S-93 The Ant

S-94 Household Pests
S-95 Some Useful Insects
S-96 Insects that Destroy Plants
S-98 Insects and Their Ways
S-99 Finding Out About Insects
S-100 Insect Homes
S-101 How Do Insects Protect Themselves?
S-102 Our Insect Enemies and Insect Friends
S-103 Collecting Insects
S-104 Backyard Insects
S-107 Insects

Vertebrates

S-108 The Common Vertebrates
S-109 Fish
S-110 Reptiles
S-111 Snakes
S-112 The Turtles
S-113 Mammals of North America

Birds

S-114 John James Audubon
S-115 Birds of the Countryside
S-116 Birds of Forest and Woodland
S-117 Birds of Towns and Villages
S-119 Birds of the Seashore
S-120 Birds of the Zoo
S-123 Looking for Birds
S-124 Nests and Eggs of Birds
S-125 Beaks and Feet of Birds
S-126 Feathers and Flight of Birds
S-127 Migration of Birds
S-128 Birds

Senses

S-129 You and Your Five Senses
S-130 The Ear
S-132 The Eyes
S-134 Your Senses of Smell and Taste
S-135 Your Sense of Touch

Circulation

S-136 Circulatory System
S-137 Work of the Blood
S-138 How the Heart Works

Respiration

S-139 Respiratory System
S-140 Human Respiration

Digestion and Food

S-141 Digestive System
S-142 You and Your Food
S-143 How Vitamins Help Man
S-144 The Teeth

Nervous System

S-145 Dangers of Narcotics
S-147 The Nervous System - Int., JH

Excretion

S-148 Excretion
S-149 Skin, Hair, and Nails

Bones and Muscles

S-150 Bones and Muscles

Whole Organism

S-151 Kinds of Cells
S-152 You, the Human Being
S-153 You, the Living Machine

Health

S-154 Workers for Health
S-155 Food for Health
S-156 Your Body and You
S-159 Strong Teeth